



Movement: Does An Industry Good?

Lessons From Fresno
Stations And Technicians

Motivation

- When measuring performance we focus on Smog Check stations, but how do technicians affect the performance of stations?
- Is variation among stations really due to the performance of technicians (apart from variation in the fleet tested)?
- How does the movement of technicians and stations affect the analysis?

Fresno

- 513 Station IDs correspond to 244 distinct addresses in operation from January 1998 through March 2007
- 522 technicians have conducted inspections in Fresno during this time frame

OK, So When I Say Fresno I
Mean 'Greater Fresno Area'



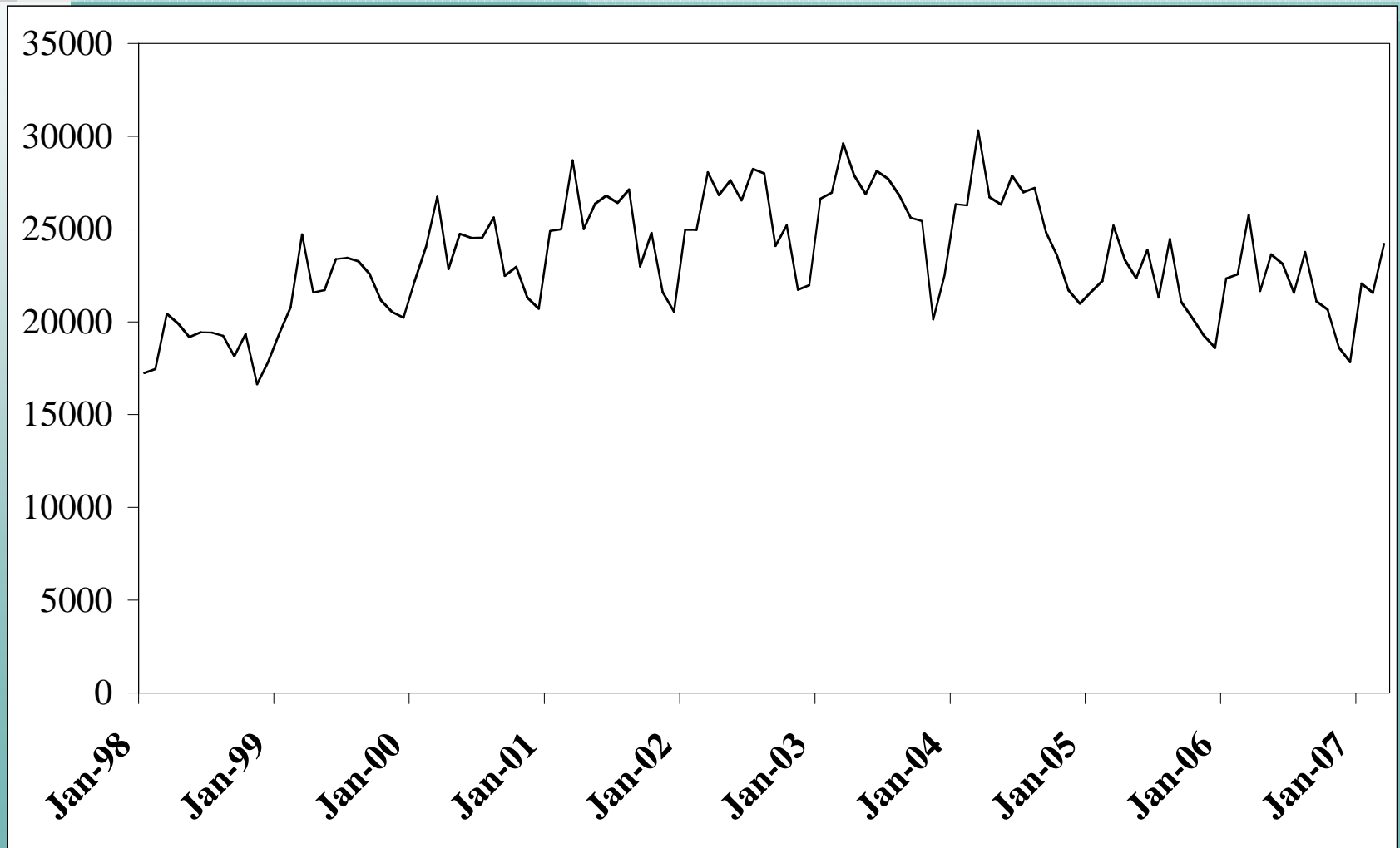
Fresno Technicians

- These 522 technicians worked in Fresno at least once during between January 1997 and March 2007
- Technicians worked at an average of 2.9 locations, with 15 as the maximum number of locations
- 198 techs worked at more than one location simultaneously
- The average number of inspections per technician was 6,307, with a maximum of 38,693 and a minimum of 2 inspections

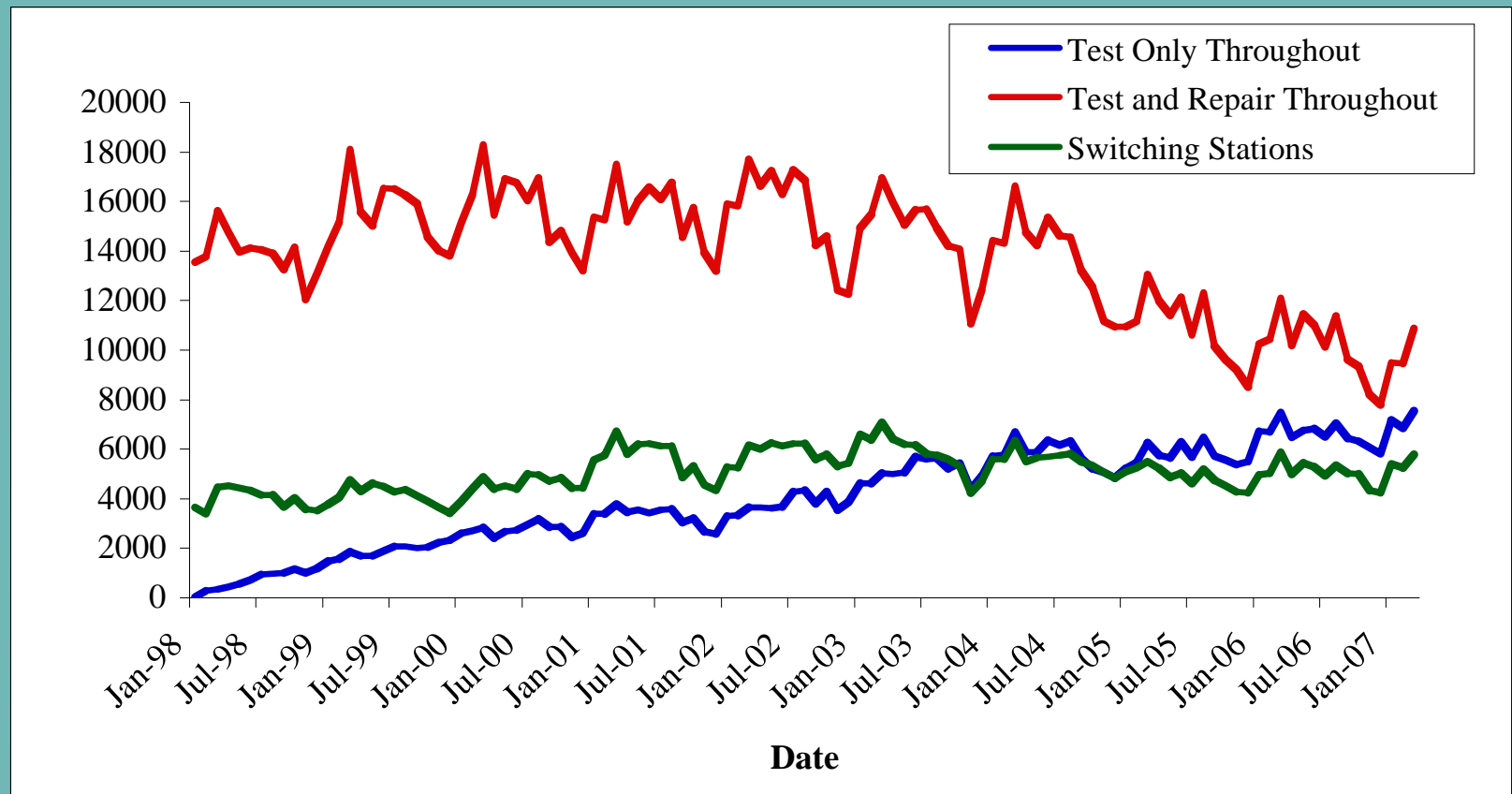
Vehicles Ever Tested In Fresno

Number of vehicles	949,815
% ASM tests	88.1%
% ever fail	33.3%
% ever a visual fail	7.5%
% ever with an abort	19.3%
% imported from elsewhere in CA	34.3%
% exported to elsewhere in CA	29.9%
% tested at more than one Fresno location	51.6%

Fresno Inspections Over Time



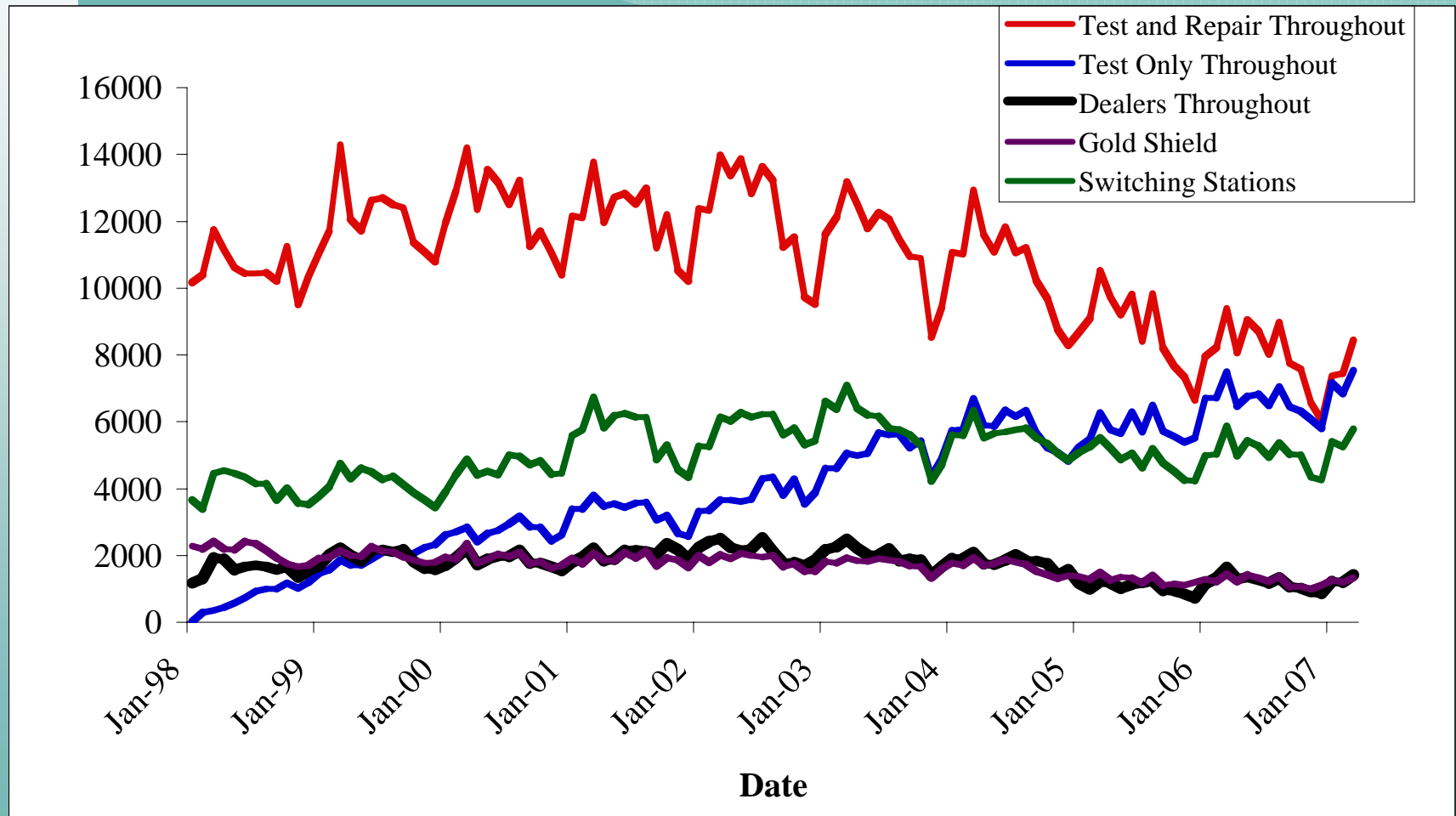
Inspection Volume by Location



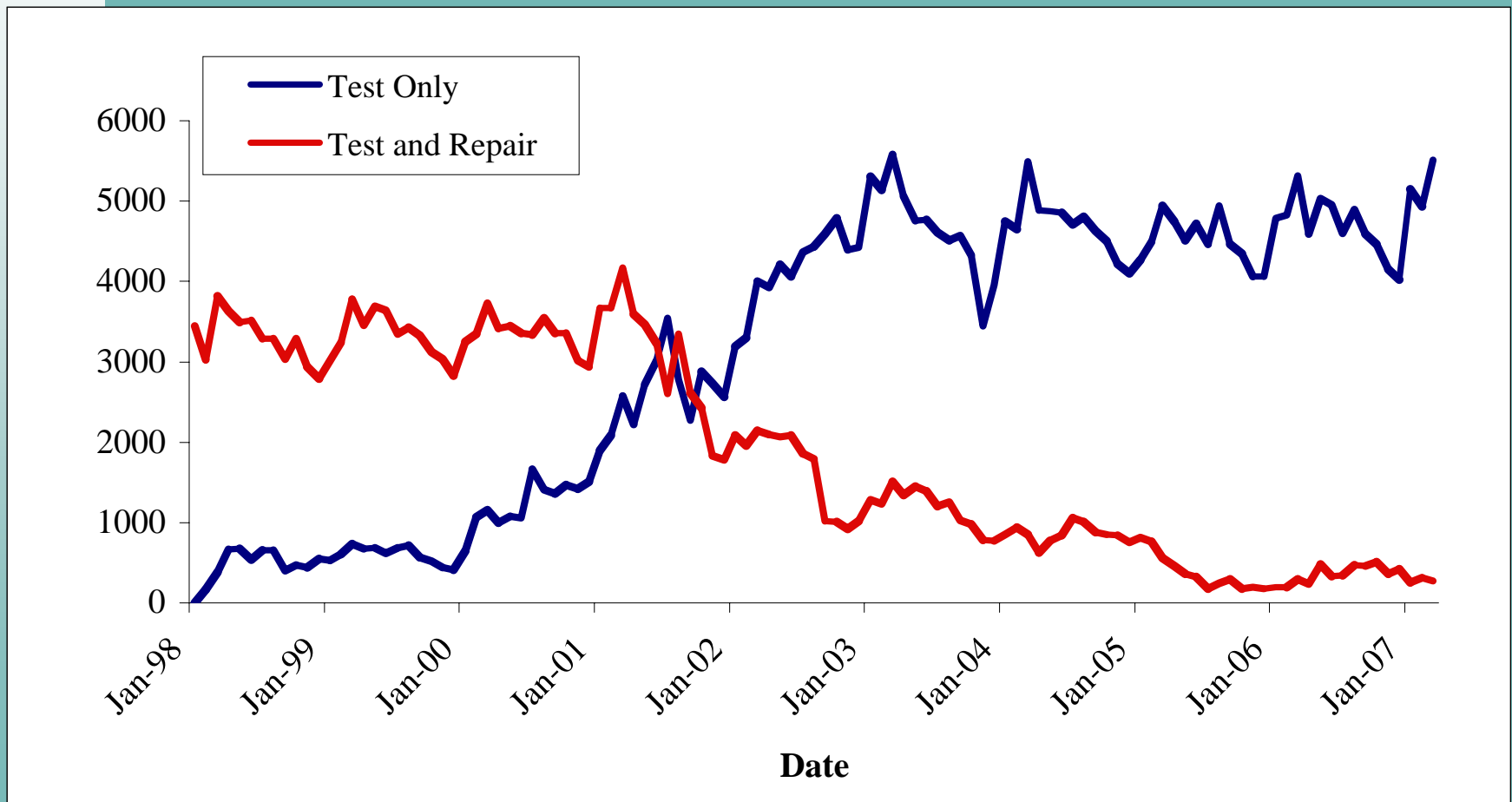
Dealers and Gold Shield

- In Fresno, there are 48 station IDs belonging to Dealers
- This corresponds to 31 unique dealer locations
- There are 19 station IDs belonging to Gold Shield stations, corresponding to 15 unique locations

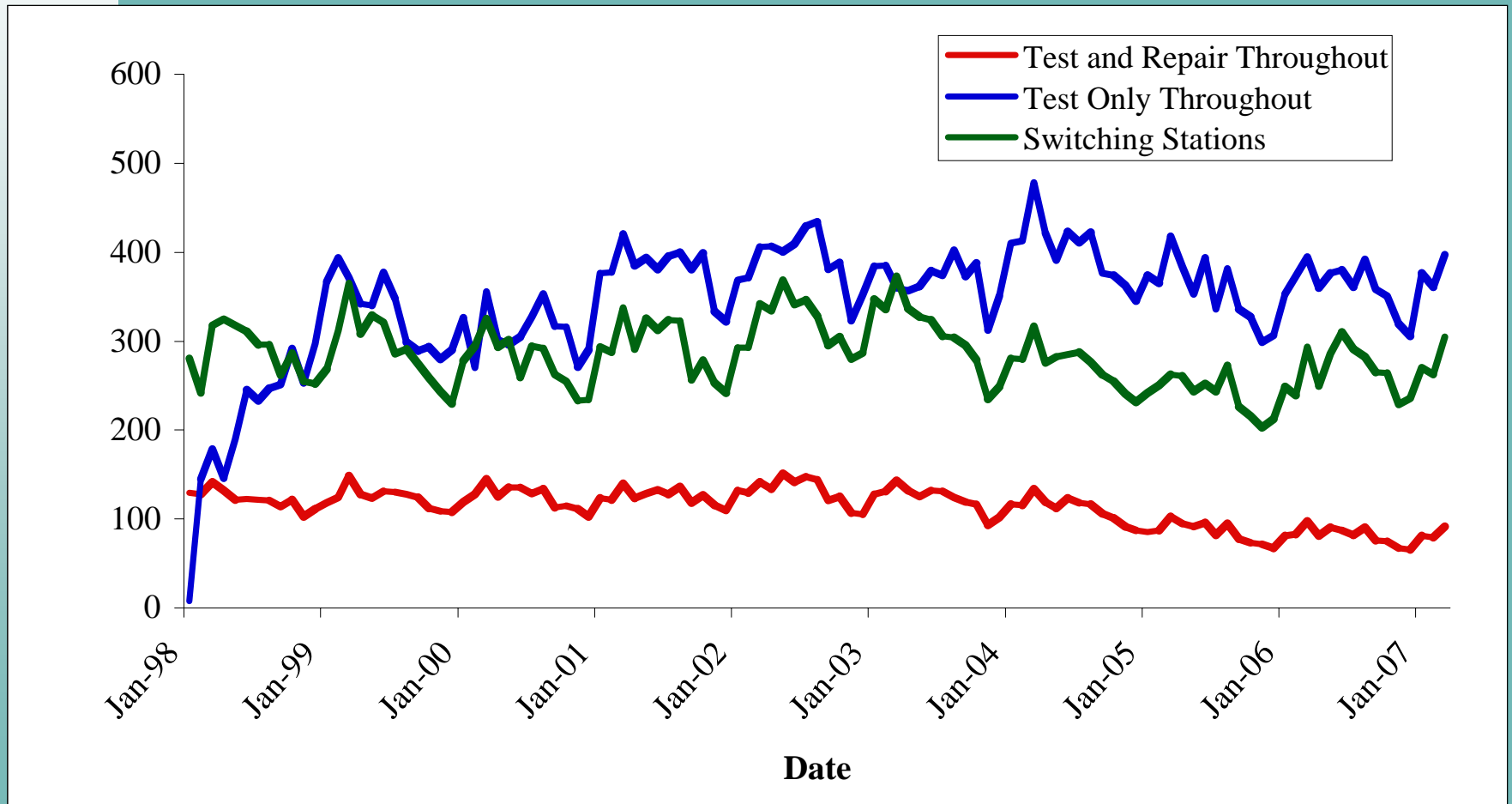
Isolating Dealers and Gold Shield



Volume of Locations that have Switched Classification



Average Volume Monthly of Stations



Which Techs are Switching?

- The Fresno locations that switched classification hired 16 techs within 90 days of the switch
- Of these 16 techs
 - 2 switched from one Test Only to another
 - 2 switched from Test Only to Test & Repair
 - 4 switched from one Test & Repair to another
 - 5 switched from Test & Repair to Test Only
- No techs were hired from locations outside of Fresno and 2 techs were new hires

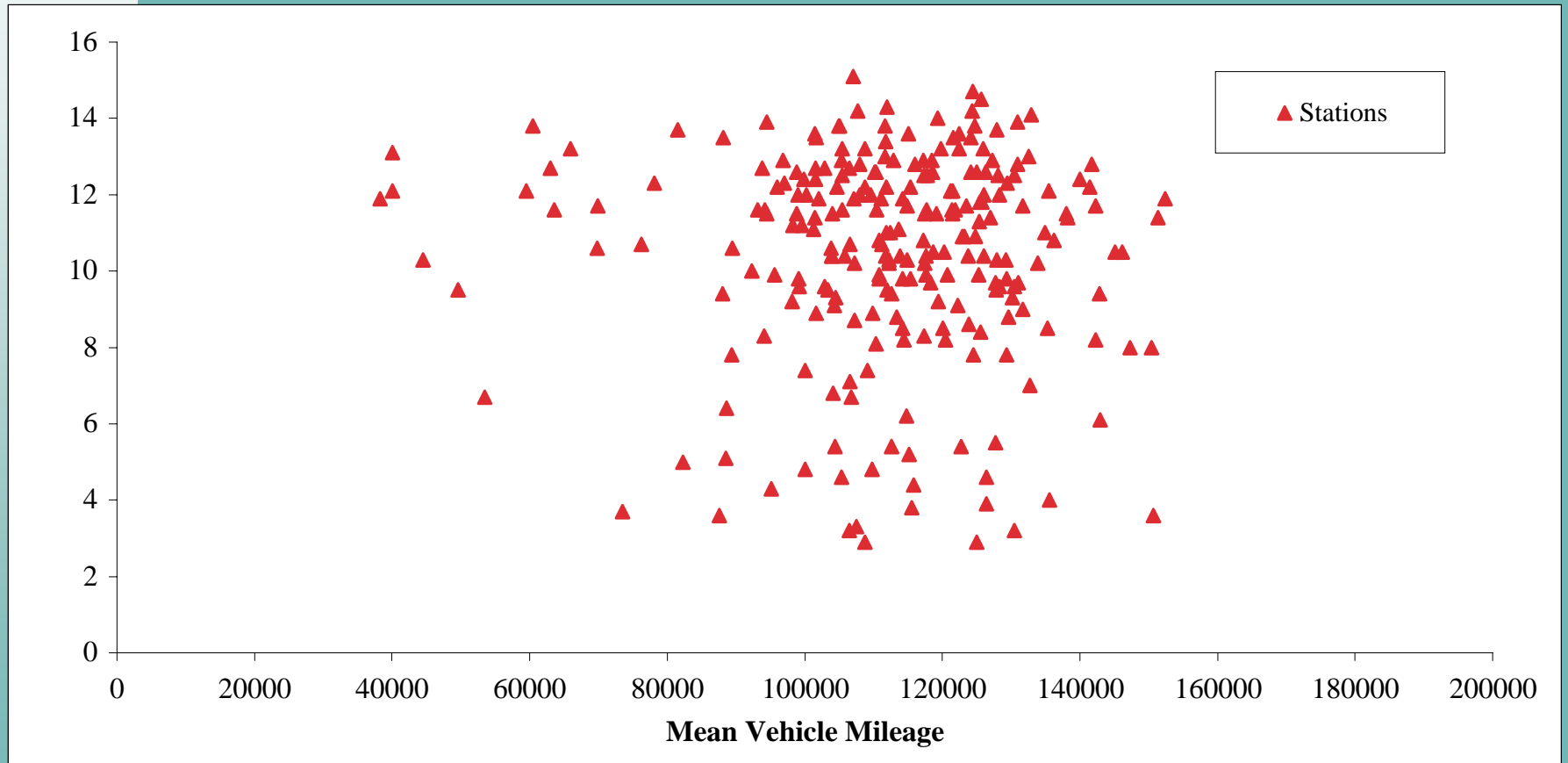
Techs at New Test Only Stations

- There are 24 stations that have been only classified as Test Only
- Where did the techs come from to work at these new station locations?

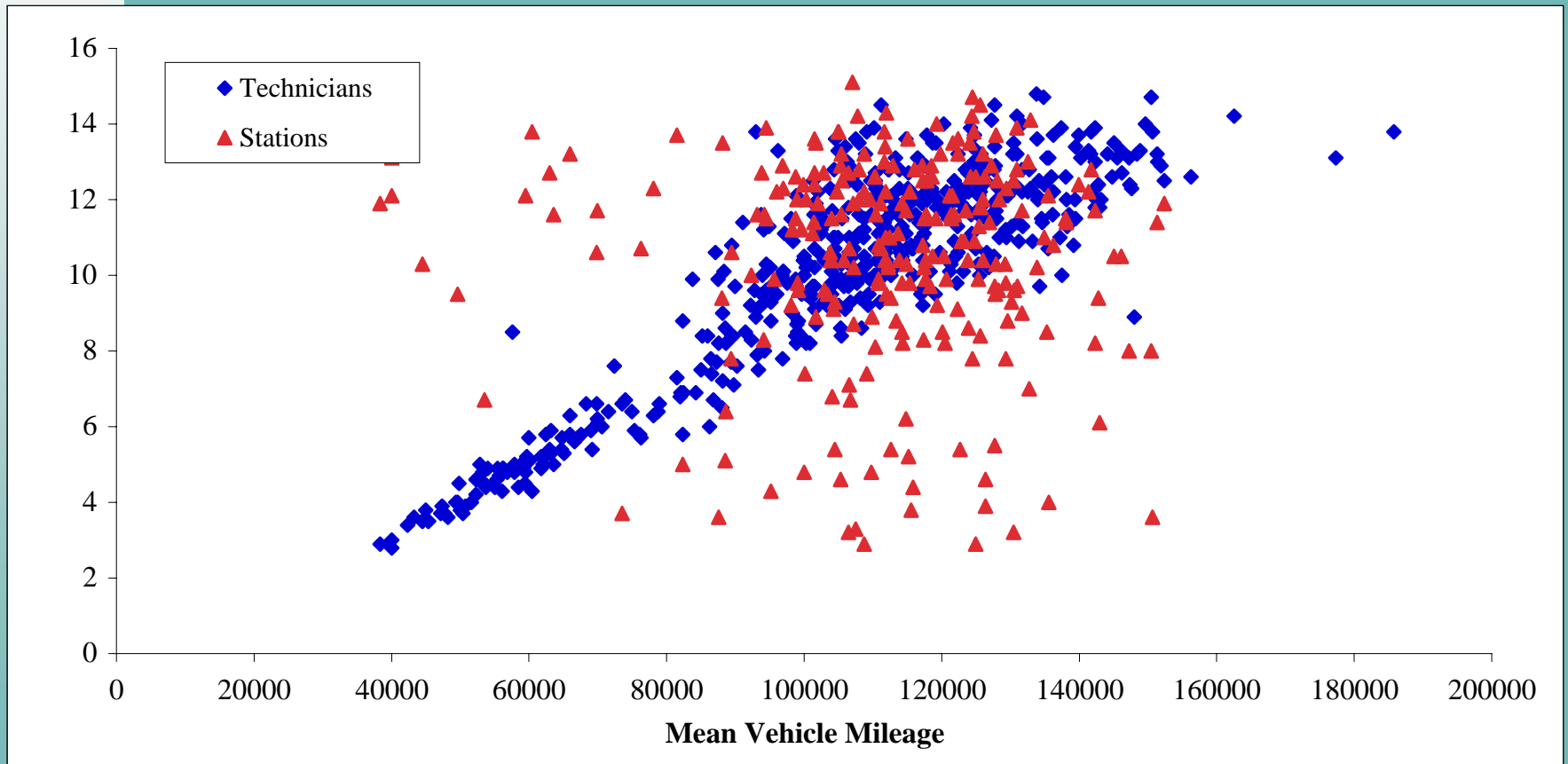
New Test Only Stations in Fresno

- 22 techs were involved in the start-up of 1 Test Only location
- 4 techs were involved in 2 start-ups
- 1 tech was involved in 3 start-ups
- Among these 27 techs
 - 13 came from a Test and Repair station in Fresno
 - 0 came from a dealer in Fresno
 - 8 transferred from another Test Only in Fresno
 - 2 came from elsewhere in California
 - 4 were new licensees

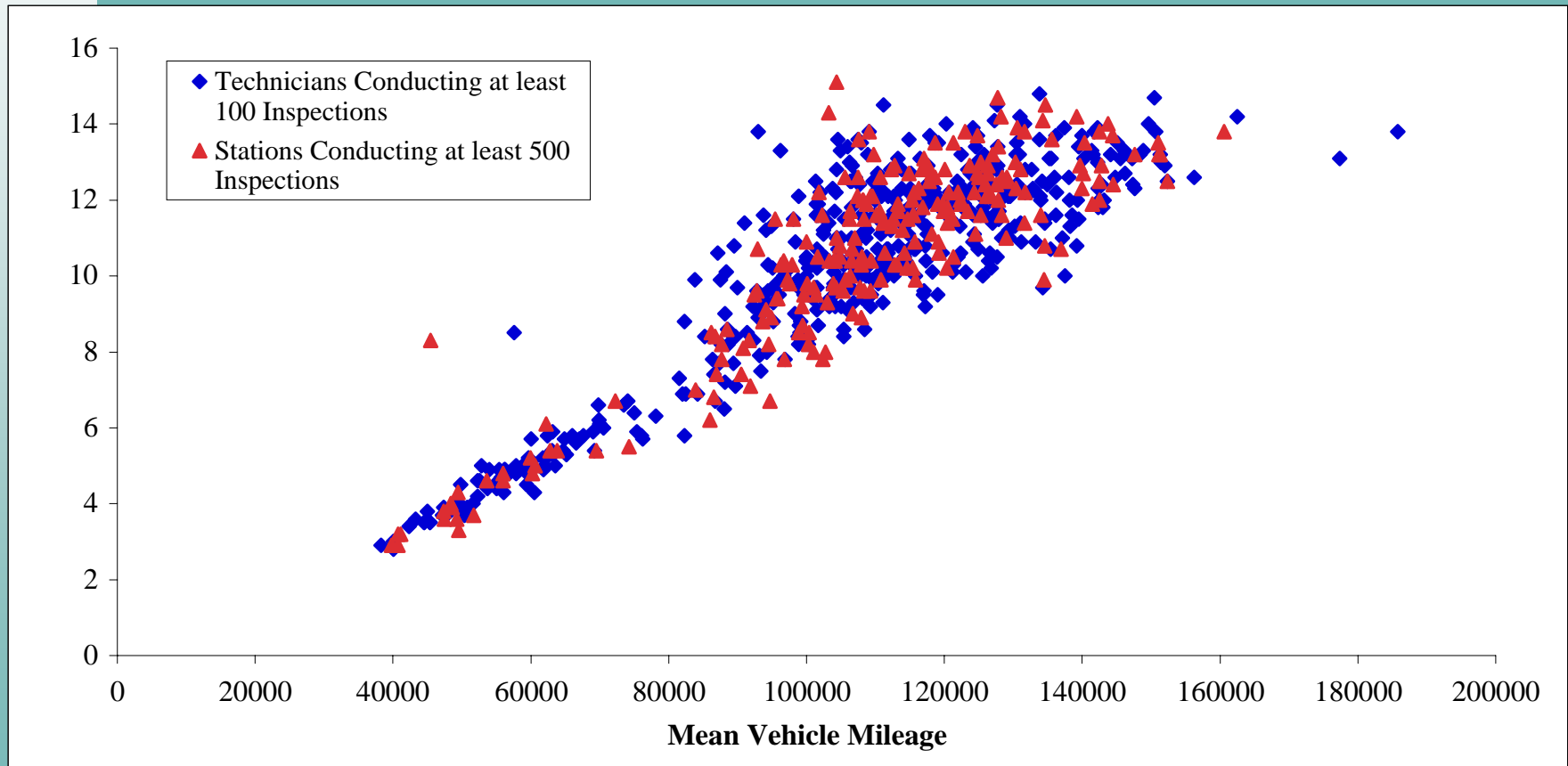
Vehicle Fleet by Station Location



Vehicle Fleet by Station Location and Tech



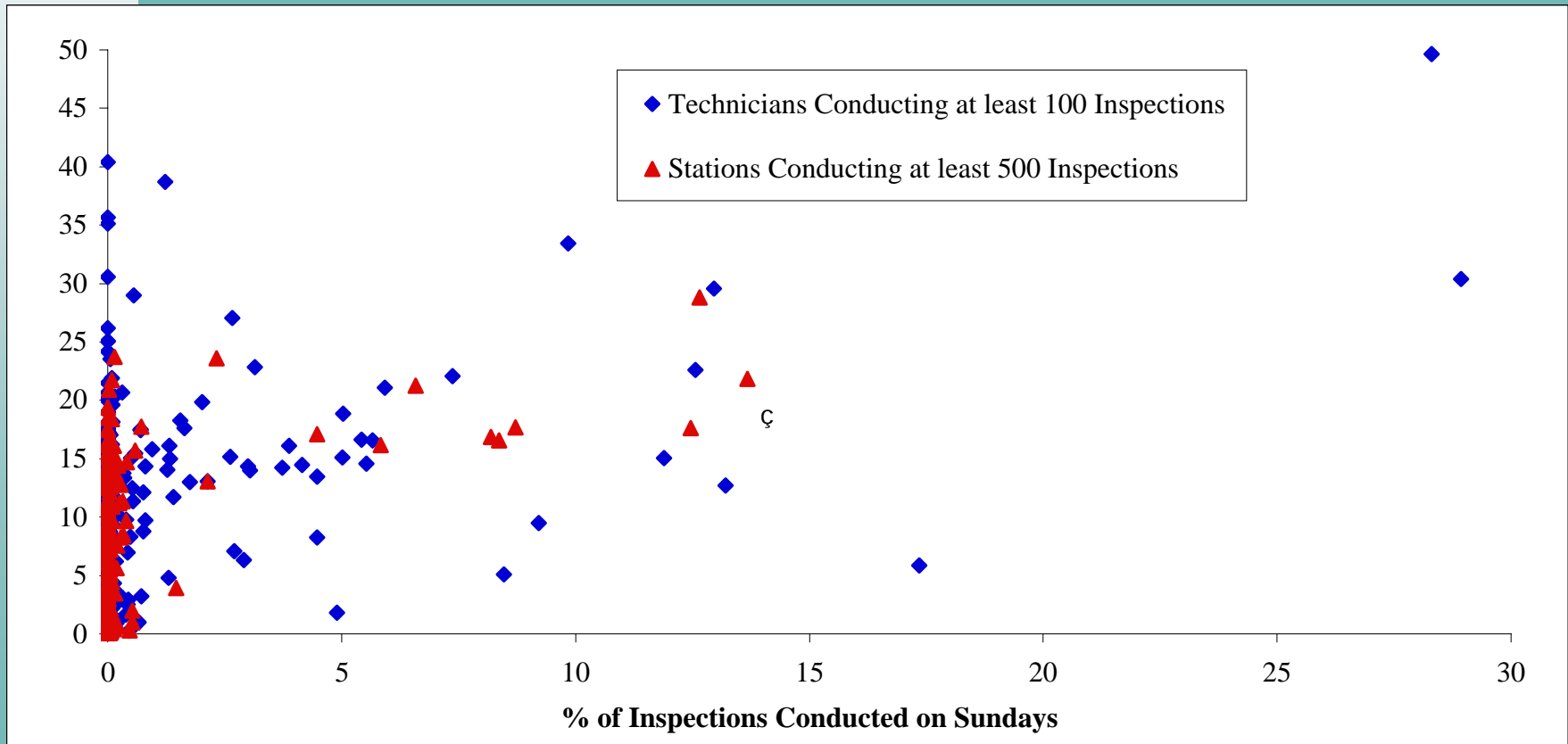
Vehicle Fleet by Station Location and Tech



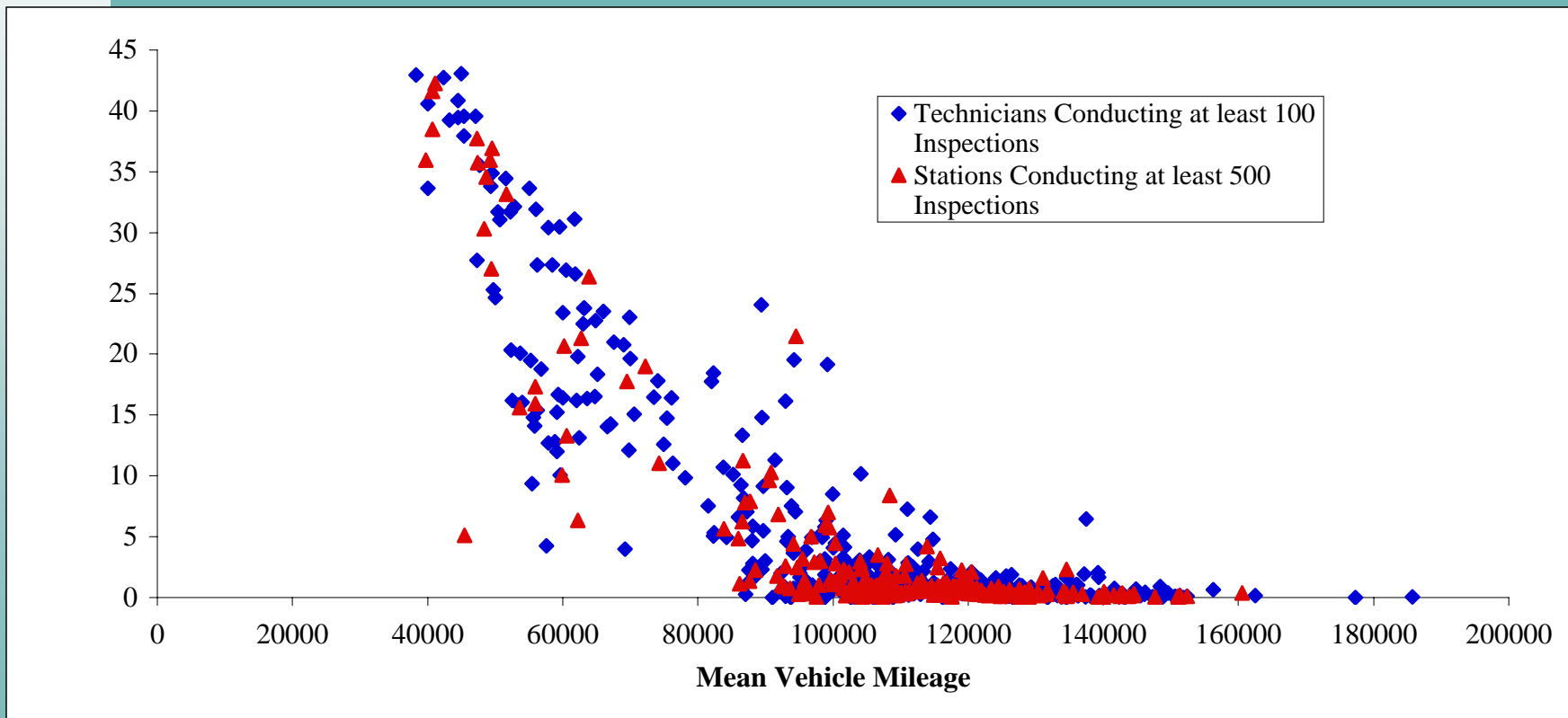
Minimum Values

- These graphs include stations that have conducted at least 500 inspections and technicians that conducted at least 100 inspections over the data set
- This criteria eliminated 27 techs and 13 locations from the resulting graphs

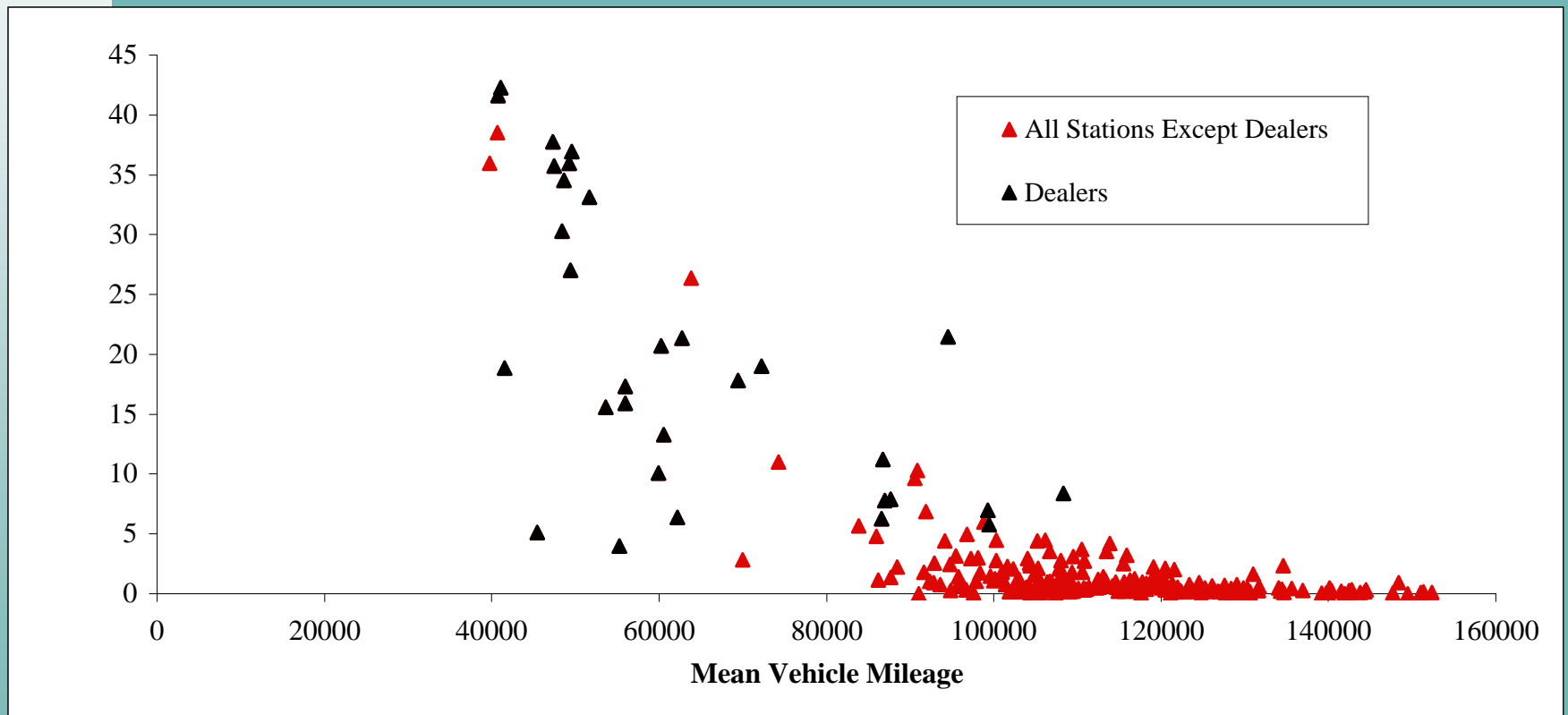
Weekend Operation By Station Location and Technician



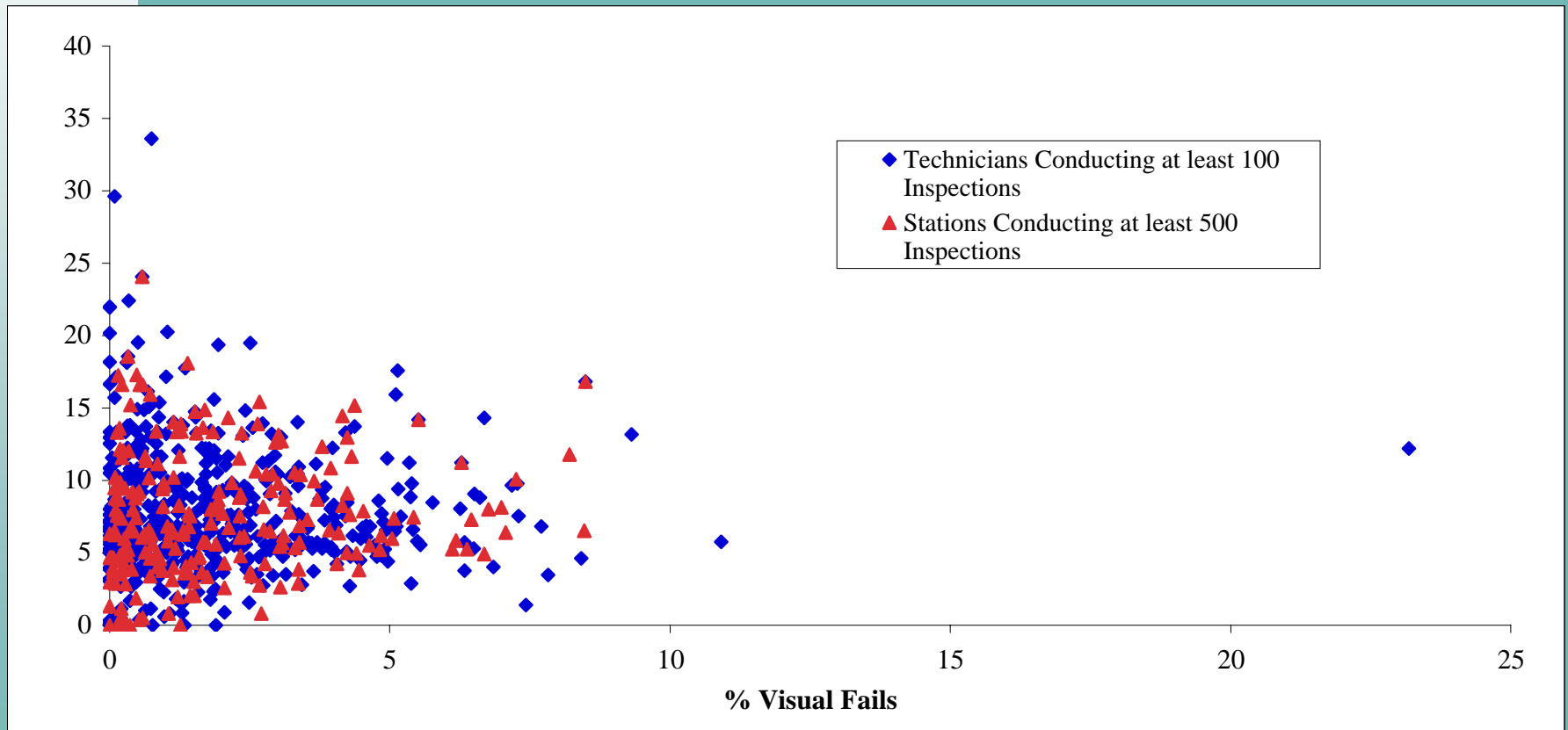
% Of New Vehicles Inspected



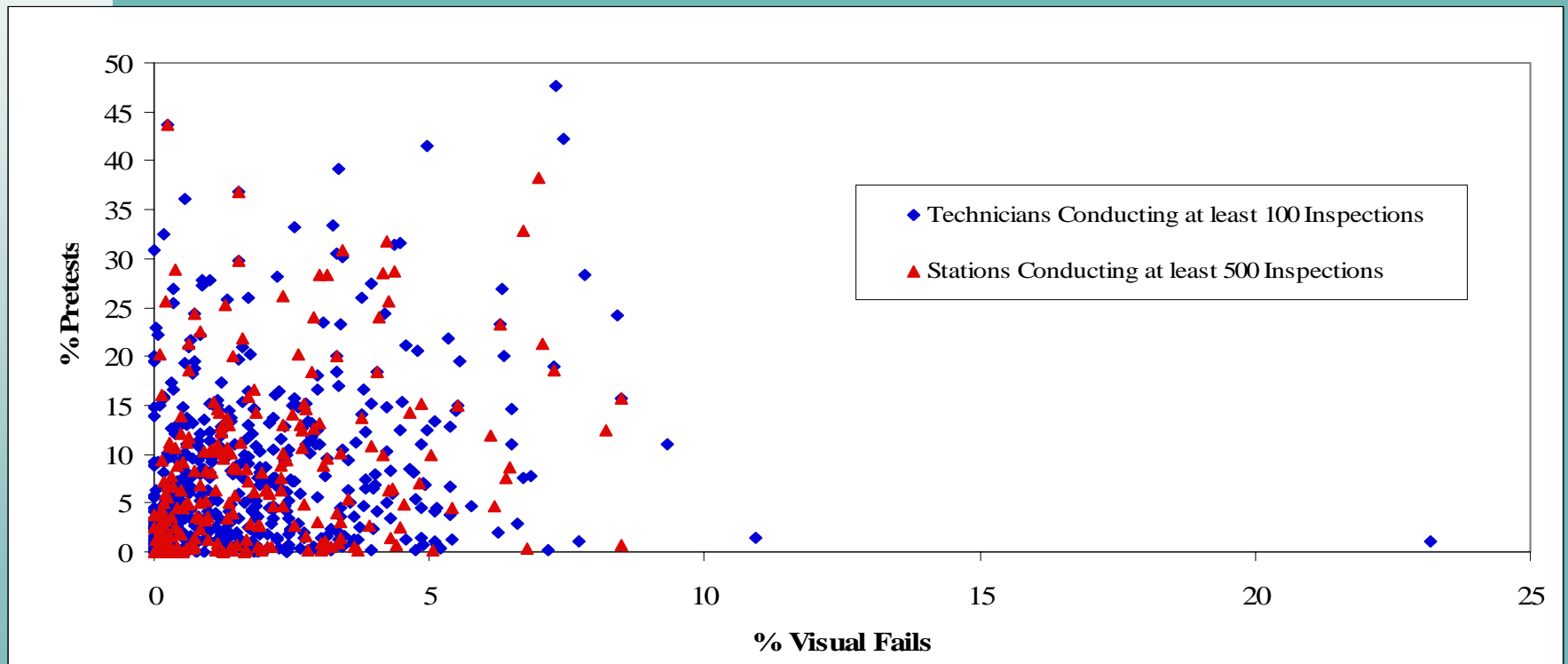
All Station Locations vs. Dealer Locations



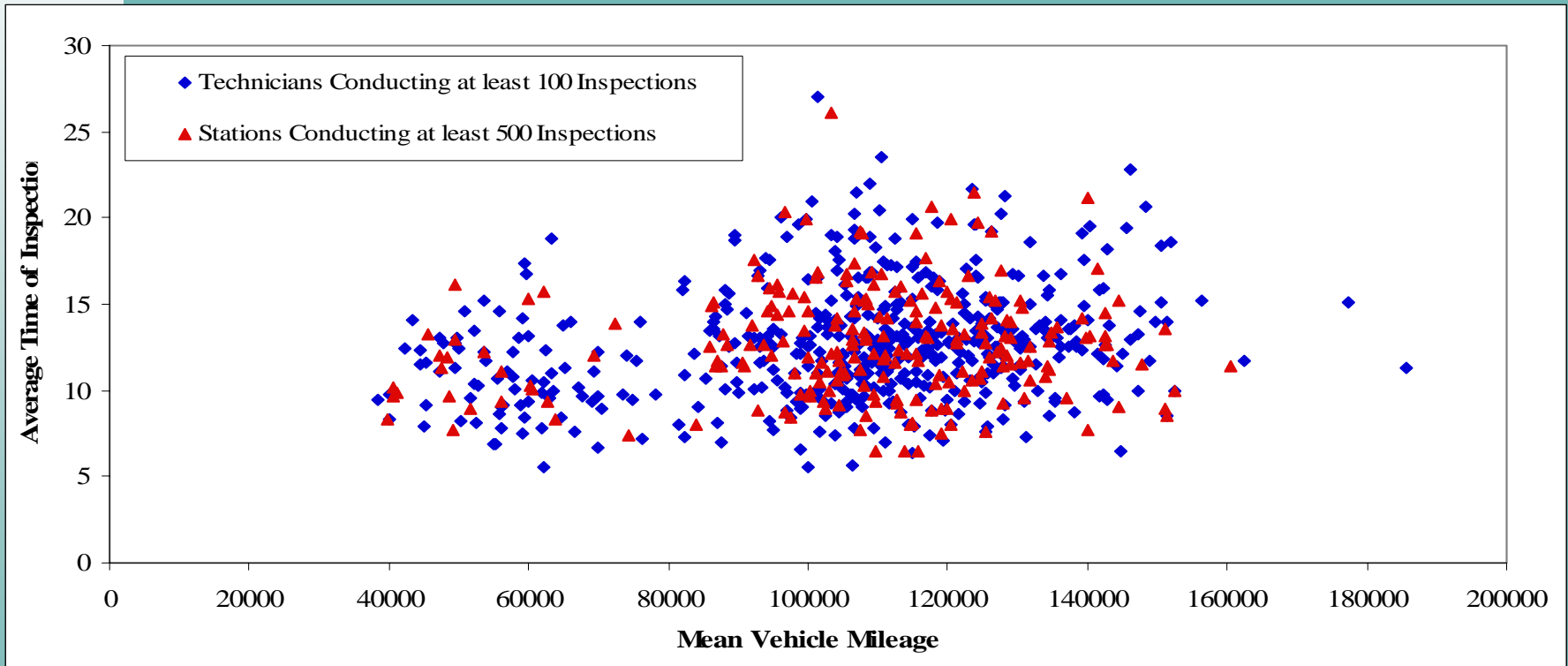
% Aborts and Visual Fails



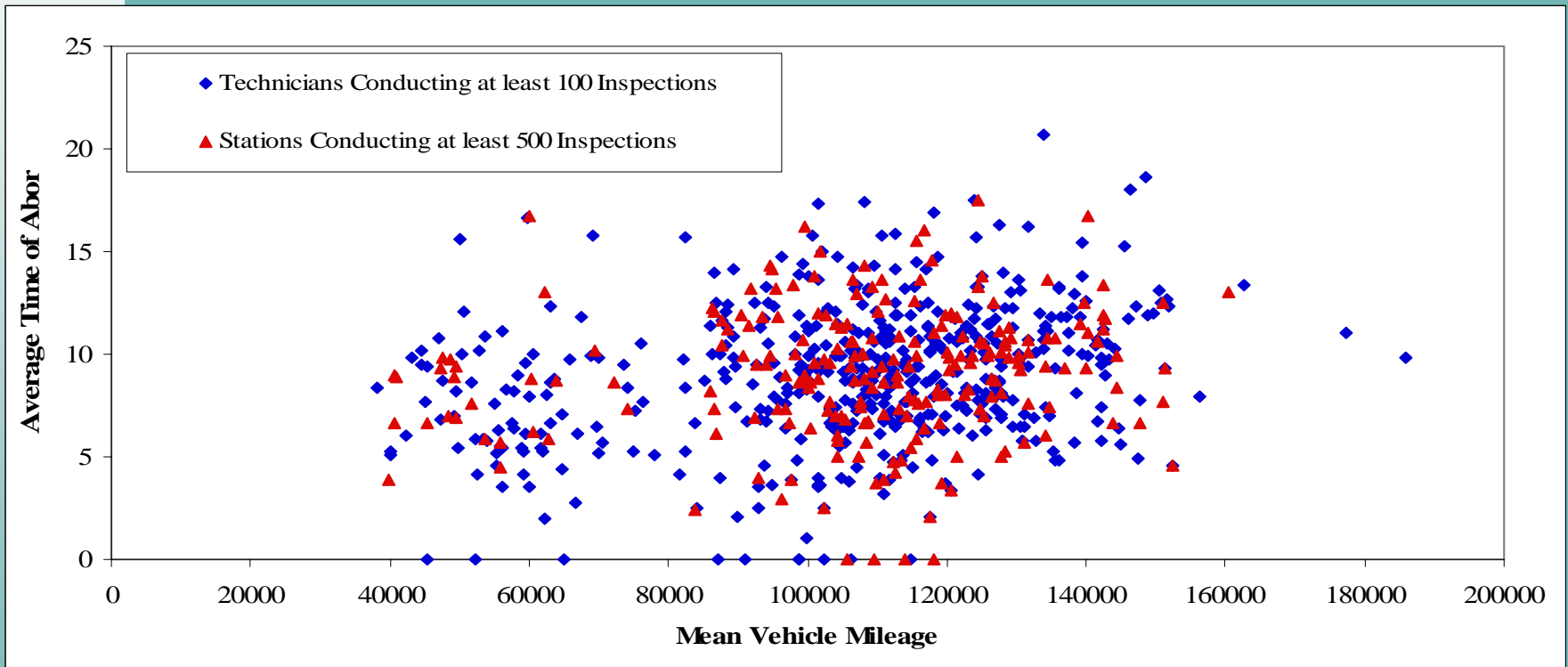
Pretests and Visual Fails



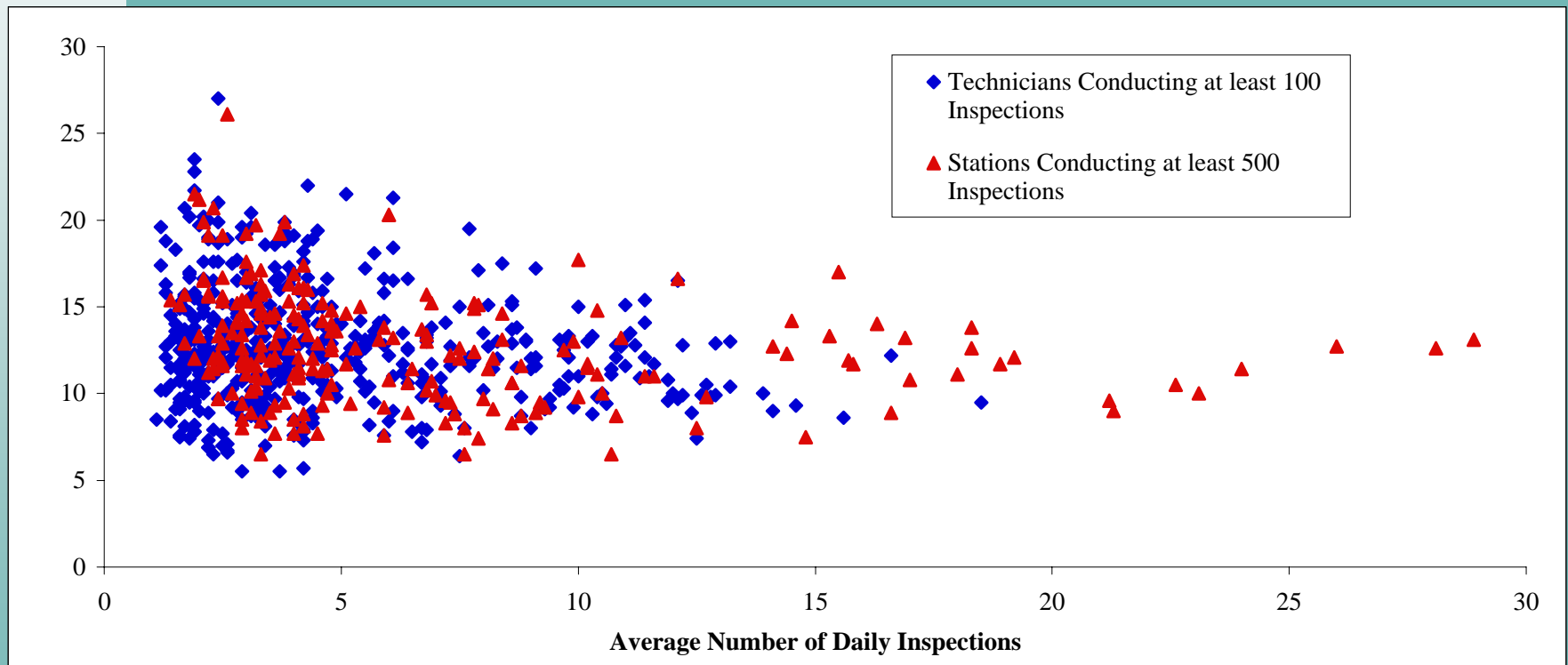
Average Inspection Time



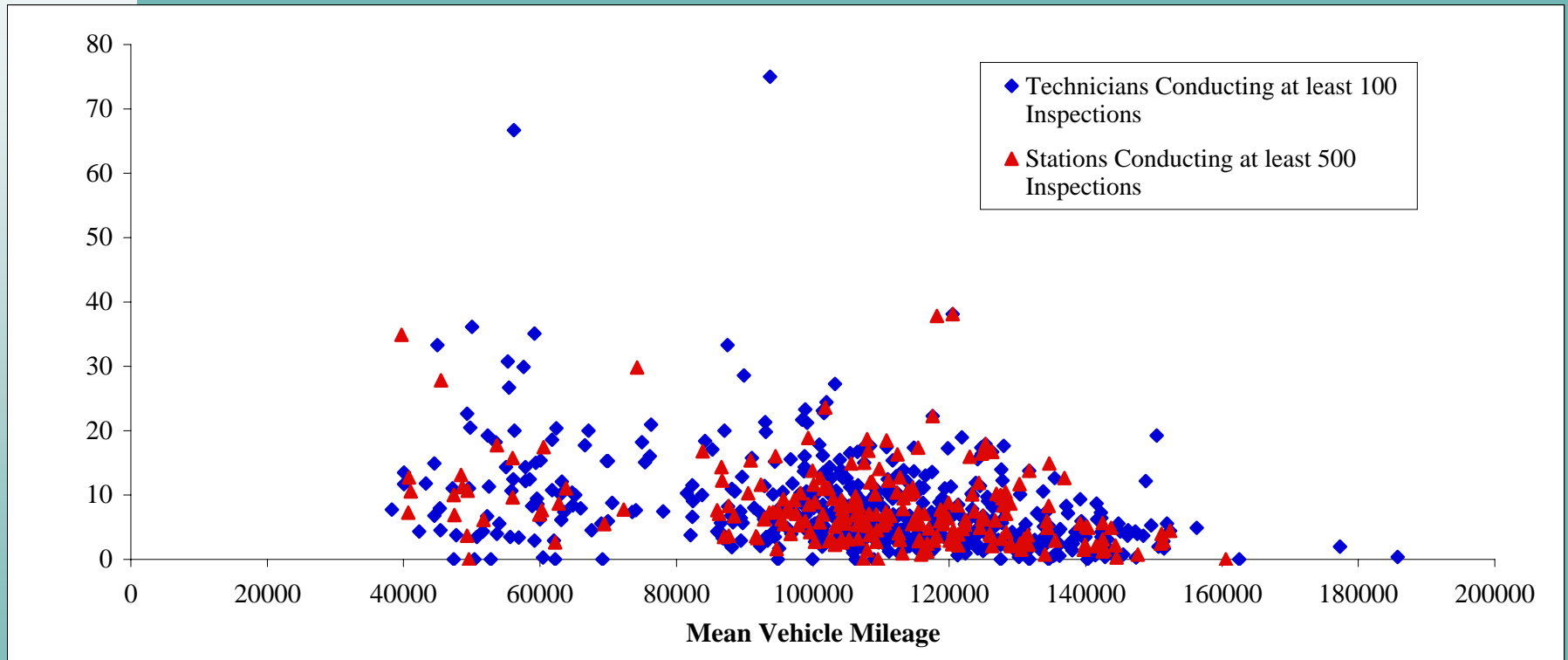
Average Length of an Abort



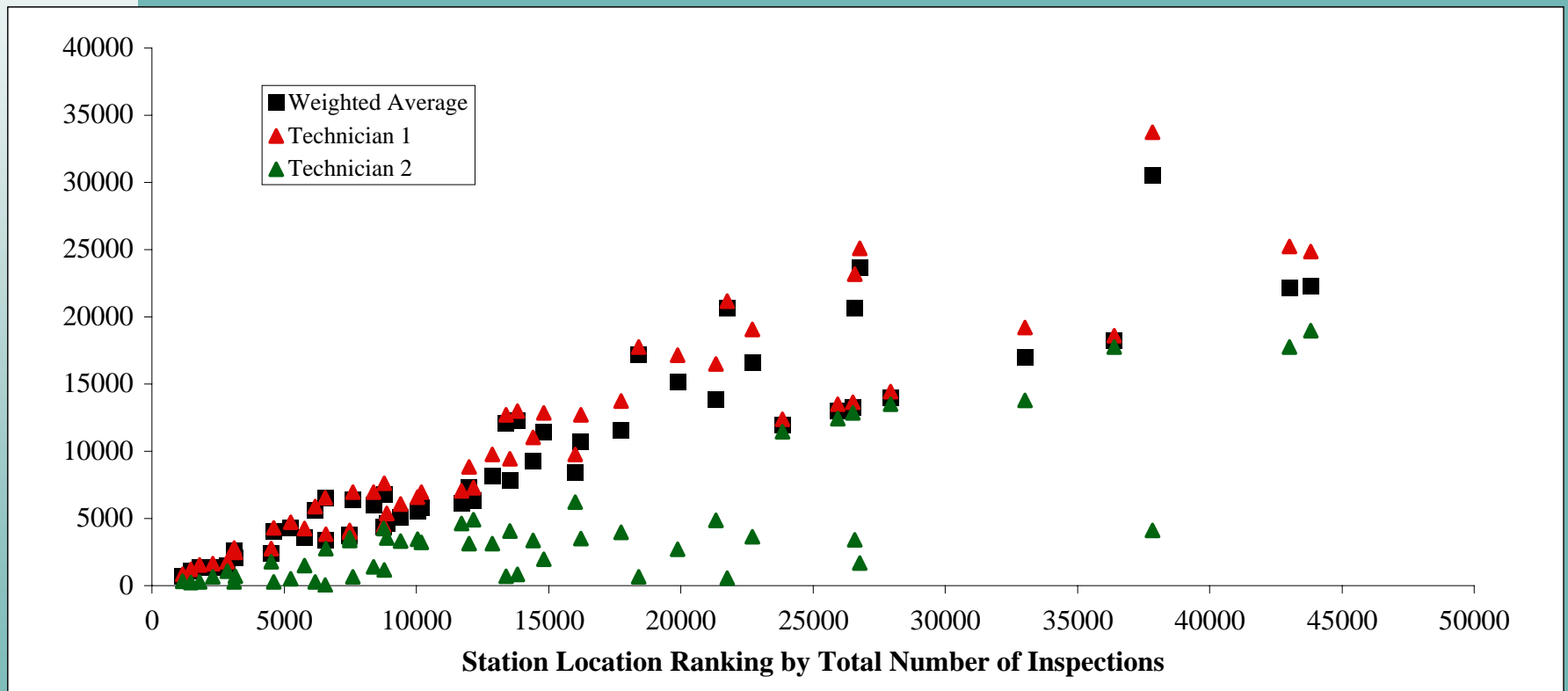
Average Inspection Time and Number of Daily Inspections



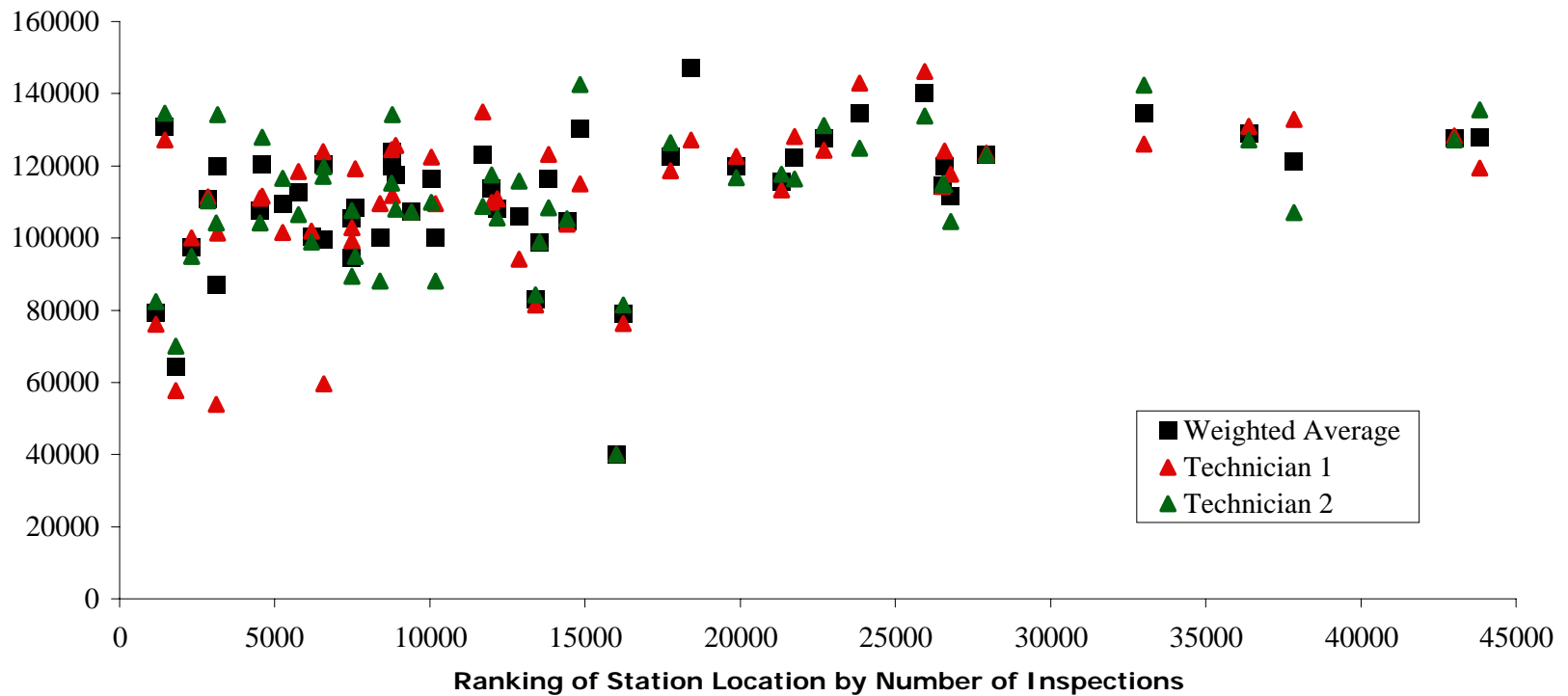
Vehicles Passing Within 20 Minutes of Failing



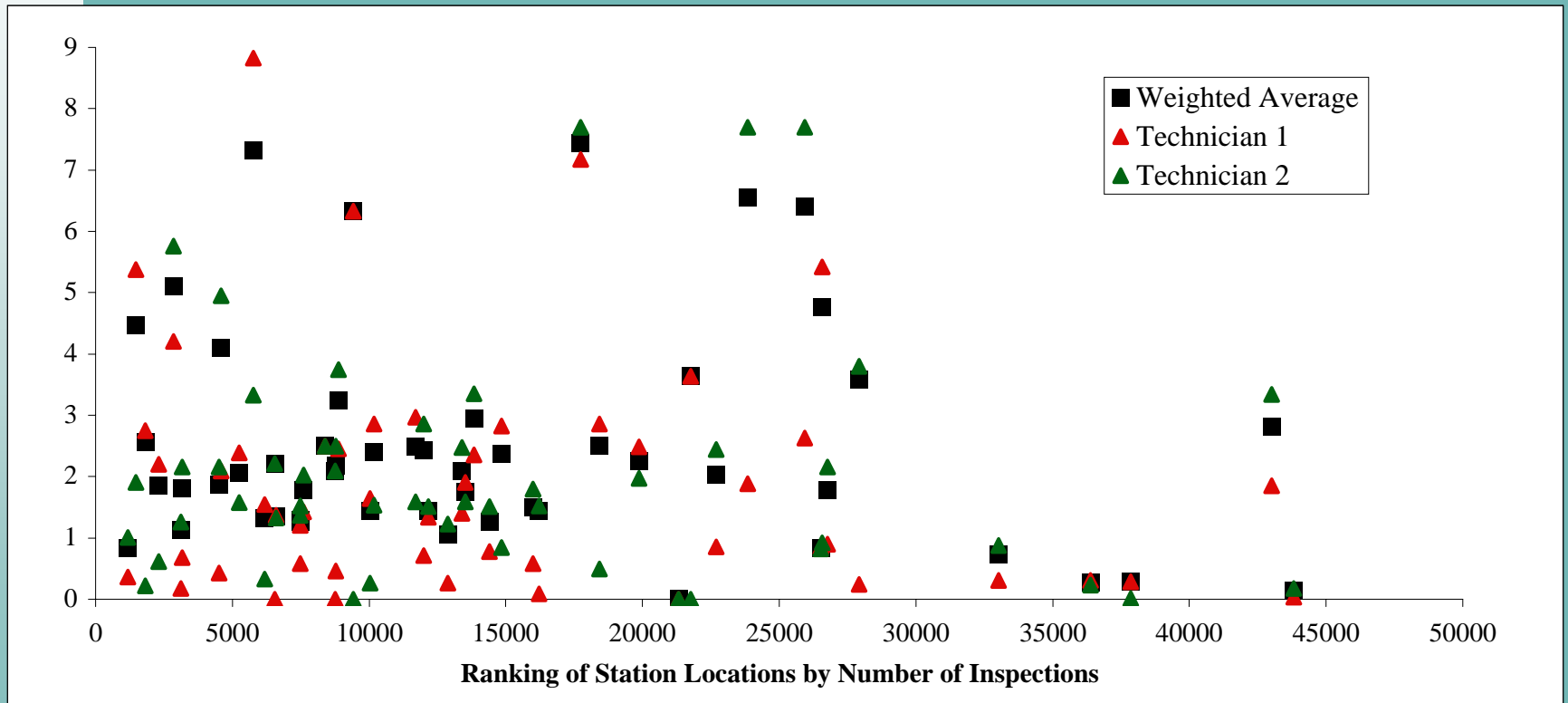
Number of Inspections at Station Locations with 2 Techs



Average Mileage at Station Locations with 2 Technicians



% Visual Fails at Station Locations with 2 Techs



Conclusions (I)

- Comparison of stations is further complicated by the variation in practices among technicians.
- The mobility among technicians is considerable.
- The changes among organization and purpose of stations is considerable.
- The common distinction drawn between Test Only and Test & Repair is too simple.

Conclusions (II)

- Some technicians and stations take so little time on tests that the visual inspection cannot have been thorough.
- Some technicians and stations pass failed vehicles so quickly that they cannot have been repaired.
- These two elements alone may represent some 15% of potential failures.